IN THE CLAIMS:

Please cancel claim 3 without prejudice or disclaimer, amend claims 1, 2, 4-7, and add new claims 8-11 as follows:

1. (Currently Amended) A sheet for covering a substrate [[hybridization device]] comprising [[a sheet having a]] at least one hydrophilic surface region containing a sample biopolymer solution having exclusively freely mobile sample biopolymers therein and a hydrophobic surface region surrounding the hydrophilic region, wherein the substrate is fixed with at least one probe biopolymer to hybridize with the freely mobile sample biopolymers in the sample biopolymer solution when the hydrophilic surface region ~~facing~~ contacting a probe-biopolymer-fixed region of [[a]] the substrate ~~when the sheet and the probe-biopolymer-fixed substrate are arranged in layers~~.

2. (Currently Amended) A sheet ~~hybridization device comprising a sheet having a~~ according to claim 1, wherein the hydrophilic surface region is hollow to provide a hollowed region lower than the hydrophobic surface region ~~and a region surrounding the hollowed region, the hollowed region facing a probe-biopolymer-fixed region of a substrate when the sheet and the probe-biopolymer-fixed substrate are arranged in layers~~.

3. (Cancelled)

4. (Currently Amended) A sheet [[hybridization device]] according to claim 1, wherein the sheet is made of a material that has affinity with the substrate.

5. (Currently Amended) A sheet [[hybridization device]] according to claim 4, wherein the sheet is made of silicone rubber.

6. (Currently Amended) A sheet [[hybridization device]] according to claim 1, wherein the sheet is [[slightly]] larger than the substrate.

7. (Currently Amended) A hybridization device, comprising a substrate fixed with [[a probe]] at least one biopolymer in a probe-biopolymer-fixed region and [[the]] a sheet [[of claim 1]] for covering the substrate, said sheet having at least one hydrophilic surface

region containing a sample biopolymer solution therein and a hydrophobic surface region surrounding the hydrophilic region, wherein said probe biopolymer hybridizes with the sample biopolymer when the hydrophilic surface region contacting the probe-biopolymer-fixed region.

8. (New) A hybridization device according to claim 7, wherein the hydrophilic surface region is hollow to provide a hollowed region lower than the hydrophobic surface region.

9. (New) A hybridization device according to claim 7, wherein the sheet is made of a material that has affinity with the substrate.

10. (New) A hybridization device according to claim 9, wherein the sheet is made of silicone rubber.

11. (New) A hybridization device according to claim 7,wherein the sheet is larger than the substrate.

REMARKS

The above amendments to the above-captioned application along with the following remarks are being submitted as a full and complete response to the Official Action dated July 30, 2003. In view of the above amendments and the following remarks, the Examiner is respectfully requested to give due reconsideration to this application, to indicate the allowability of the claims, and to pass this case to issue.

Status of the Claims

Claims 1-2 and 4-11 are under consideration in this application. Claim 3 is being cancelled without prejudice or disclaimer. Claims 1, 2, 4-7 are being amended, as set forth in the above marked-up presentation of the claim amendments, in order to more particularly define and distinctly claim applicants' invention. New claims 8-11 are being added to recited other embodiments described in the specification.

Additional Amendments

The specification and the claims are being amended to correct formal errors and/or to better recite or describe the features of the present invention as claimed. All the amendments to the claims are supported by the specification. Applicants hereby submit that no new matter is being introduced into the application through the submission of this response.

Formality Rejections

Claims 1-7 were rejected under 35 U.S.C. § 112, first paragraph, for claiming the invention which is not described in the specification in a manner that will enable a skilled person in the art to make or use the invention. In addition, claim 6 was rejected under 35 U.S.C. § 112, second paragraph, as being indefinite. The claims are being amended either according to the Examiner's suggestion or to be enabled by the specification by reciting the corresponding US application of JP. Pat. No. 2756474. Accordingly, the withdrawal of the outstanding formal objections is in order, and is therefore respectfully solicited.

Prior Art Rejections

Claims 1-7 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Pat. No. 5,414,075 Swan et al. (hereinafter "Swan") in view of U.S. Pat. No. 6,548,020 Okamoto et

al. (hereinafter "Okamoto"). The prior art references of Carrico (5,200,313), Sato et al. (2002/0127588) were cited as being pertinent to the present application. This rejection has been carefully considered, but is most respectfully traversed.

The sheet 2 for covering a substrate of the present invention (Figs. 1-2), as now claimed in independent claim 1, comprises: at least one hydrophilic surface region a sample biopolymer solution having **exclusively** freely mobile sample biopolymers therein (page 4, last paragraph; e.g., sample DNA page 1, line 18) and a hydrophobic surface region 4 surrounding the hydrophilic region 3. The substrate is fixed with at least one probe biopolymer (e.g, a DNA chip; page 1, lines 10-11) to hybridize with **freely mobile** sample biopolymers in the sample biopolymer solution when the hydrophilic surface region 3 contacting a probe-biopolymer-fixed region of the substrate.

The result of "the sample biopolymer solution having **exclusively** freely mobile sample biopolymers therein" is derived from that the method described on pages 4-5 does not include any step for fixing the sample biopolymers on the sheet such that the sample biopolymer solution does not immerse any sample bioploymers fixed on the sheet

The invention is further directed to a hybridization device, as now recited in claim 7, comprising a substrate fixed with at least one biopolymer in a probe-biopolymer-fixed region and the sheet described in claim 1.

A photocatalyst semiconductor thin film is formed over the entire surface of the silicone rubber sheet then is irradiated with UV light via a mask 1 to selectively form the hydrophilic region 3 thereon. UV irritated photocatalyst semiconductor becomes hydrophilic. Silicone rubber remains hydrophobic even coated photocatalyst semiconductor material (page 6, 3rd and 4th paragraphs). As recited in claims 1 and 7, since the hydrophilic region 3 is surrounded by the hydrophobic region 4, the sample biopolymer solution selectively stays on the hydrophilic region 3 (page 4, last paragraph). The invention allows hybridization reaction that takes long time to be carried out stably with a small amount of sample biopolymer solution even without a sealing case or water for preventing the sample biopolymer solution from evaporating (page 5, 5th paragraph; Abstract).

As silicone rubber has good affinity with glass, the silicone-rubber-based sheet 2 (claims 4-5) has a sufficient level of adhesiveness with the slide glass to seal the sample biopolymer solution. The device of claim 7 is maintained at a relatively high constant temperature to allow hybridization reaction. During the course of reaction, a slight amount of sample biopolymer solution on the hydrophobic region 4 will evaporate, which will enhance adhesiveness and thus

sealing. By using an elastic material such as silicone rubber as the sheet 2, it is easier to separate the hydrophobic region 4 of the sheet 2 from the slide glass. Since the sample biopolymer solution remains on the hydrophilic region 3, the hydrophilic region 3 of the sheet 2 is much easier to be separated from the slide glass. The peeling can further be facilitated by making the size of the sheet 2 larger than the size of the slide glass (claim 6) so that the corner of the sheet 2 can be pinched (page 5, 1st to 3rd paragraphs).

Applicants contend that none of the cited prior art references teaches or suggests such a sheet for covering a substrate having at least one hydrophilic surface region containing a sample biopolymer solution having **exclusively** freely mobile sample biopolymers therein and a hydrophobic surface region surrounding the hydrophilic region to facilitate hybridization reaction between the freely mobile sample biopolymers in the sample biopolymer solution and the probe biopolymer(s) fixed on the substrate.

In contrast, Swan only discloses silicones, and rubber-like plastics (col. 8, lines 63-64) being used as supports for attaching target molecules thereon (col. 9, lines 4-6). In particular, "the target molecules are *immobilized* singly or in combination with other types of target molecules (col. 9, lines 8-10)." In other words, the silicones, and rubber-like plastics has target molecules **immobilized** thereon, rather than **freely mobile** in a solution contained thereon.

Even assuming the multifunctional reagent as the sample biopolymer of the invention, the support is completely coated with the regent by dipping the support in a reagent solution (col. 10, lines 27-29). In other words, Swan has only hydrophilic surface region on the support (containing a reagent solution therein) but NO hydrophobic surface region (which does not contain any reagent solution thereon). It is important to distinguish that Swan use UV to irritate the support ***after*** it fully coated with the reagent solution ("*The reagent-coated support is then exposed to ultraviolet fight*" col. 10, lines 30-31) rather than ***before*** it is applied with the reagent solution. On the contrary, the invention uses UV light to form the hydrophilic surface region and the hydrophobic surface region then applies the sample biopolymer solution only onto the hydrophilic surface region.

Further more, the reagent-coated support in Swan is exposed to ultraviolet fight in order to promote covalent bond formation at the material surface. On the contrary, there is NO covalent bond formed between the sample bioploymer and the hydrophilic surface region such that the sample bioploymer *freely mobile* in the solution to hybrid with the probe biopolymer fixed on the substrate later.

Even more, the "*target molecules can be immobilized to the surface either after (e.g.,*

sequentially), or during (e.g., simultaneously with) attachment of the present multifunctional reagent to the surface (col. 9, lines 10-13)" such that Swan does not necessarily facilitate hybridization reaction between the target molecules fixed on the surface and the multifunctional reagent in a solution. In fact, Swan washes the UV-irritated reagent-coated support to remove any unbound reagent, then applies the target molecules, irritates a second UV (rather than hybridize with the reagent) to immobilize the target molecules thereon (col. 10, lines 32-36).

It is well established that a rejection based on cited references having contradictory principles or principles as mentioned-above that teach away from the invention is improper.

Okamoto was relied upon by the Examiner to teach a hollowed hydrophilic surface region surrounded by a hydrophobic surface region (claim 2). However, Okamoto shares a similar deficiency as Swan that the alleged hydrophilic surface region in Okamoto is immobiled with biopolymers. On the other hand, the hydrophilic surface region of the invention only carries the sample bioploymer solution with **freely mobile** biopolymers therein so as to hybrid with the probe bioploymers fixed on the substrate later.

The other cited references fail to compensate for Swan and Okamoto's deficiencies.

Although the invention applies the general sheet a hydrophilic surface region and a hydrophobic surface region, the invention requires "the hydrophilic surface region containing a sample biopolymer solution having exclusively freely mobile sample biopolymers therein to facilitate hybridization reaction between the freely mobile sample biopolymers in the sample biopolymer solution and the probe biopolymer(s) fixed on the substrate" to achieve unexpected results or properties as described above. The presence of these unexpected properties is evidence of nonobviousness. MPEP§716.02(a).

> "*Presence of a property not possessed by the prior art is evidence of nonobviousness. In re Papesch, 315 F.2d 381, 137 USPQ 43 (CCPA 1963) (rejection of claims to compound structurally similar to the prior art compound was reversed because claimed compound unexpectedly possessed anti-inflammatory properties not possessed by the prior art compound); Ex parte Thumm, 132 USPQ 66 (Bd. App. 1961) (Appellant showed that the claimed range of ethylene diamine was effective for the purpose of producing " 'regenerated cellulose consisting substantially entirely of skin' " whereas the prior art warned "this compound has 'practically no effect.' ").*

Although "[[t]]*he submission of evidence that a new product possesses unexpected properties does not necessarily require a conclusion that the claimed invention is nonobvious.*

In re Payne, 606 F.2d 303, 203 USPQ 245 (CCPA 1979). See the discussion of latent properties and additional advantages in MPEP § 2145." Applicant would like to point out that the unexpected properties were unknown and non-inherent functions in view of Swan and Okamoto, since they do not inherently achieve the same results. In other words, these advantages would not flow naturally from following their teachings, since they fail to suggest the "the hydrophilic surface region containing a sample biopolymer solution having exclusively freely mobile sample biopolymers therein to facilitate hybridization reaction between the freely mobile sample biopolymers in the sample biopolymer solution and the probe biopolymer(s) fixed on the substrate" of the invention.

Even if one of skill in the art could accidentally arrange the sample and probe biopolymers on a sheet and a substrate to meet the terms of the claims, the mere fact is not by itself sufficient to support a finding of obviousness. The prior art must provide a motivation or reason for one skilled in the art to provide the above-described unexpected properties without the benefit of appellant's specification, to make the necessary changes in the reference embodiments. *Ex parte Chicago Rawhide Mfg. Co.*, 223 USPQ 351, 353 (Bd. Pat. App. & Inter. 1984). MPEP§2144.04 VI C.

Applicants contend that neither Swan and Okamoto, nor their combination teaches or discloses each and every feature of the present invention as disclosed in at least independent claims 1 and 7. As such, the present invention as now claimed is distinguishable and thereby allowable over the rejections raised in the Office Action. The withdrawal of the outstanding prior art rejections is in order, and is respectfully solicited.

In view of all the above, clear and distinct differences as discussed exist between the present invention as now claimed and the prior art reference upon which the rejections in the Office Action rely, Applicant respectfully contends that the prior art references cannot anticipate the present invention or render the present invention obvious. Rather, the present invention as a whole is distinguishable, and thereby allowable over the prior art.

Favorable reconsideration of this application is respectfully solicited. Should there be any outstanding issues requiring discussion that would further the prosecution and allowance of

the above-captioned application, the Examiner is invited to contact the Applicants' undersigned representative at the address and phone number indicated below.

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